May 10, 1927. 1,628,262

D. R. McGINNIS

HEAVY DUTY LOCOMOTIVE

Filed Feb. 12 1926 3 Sheets-Sheet 1

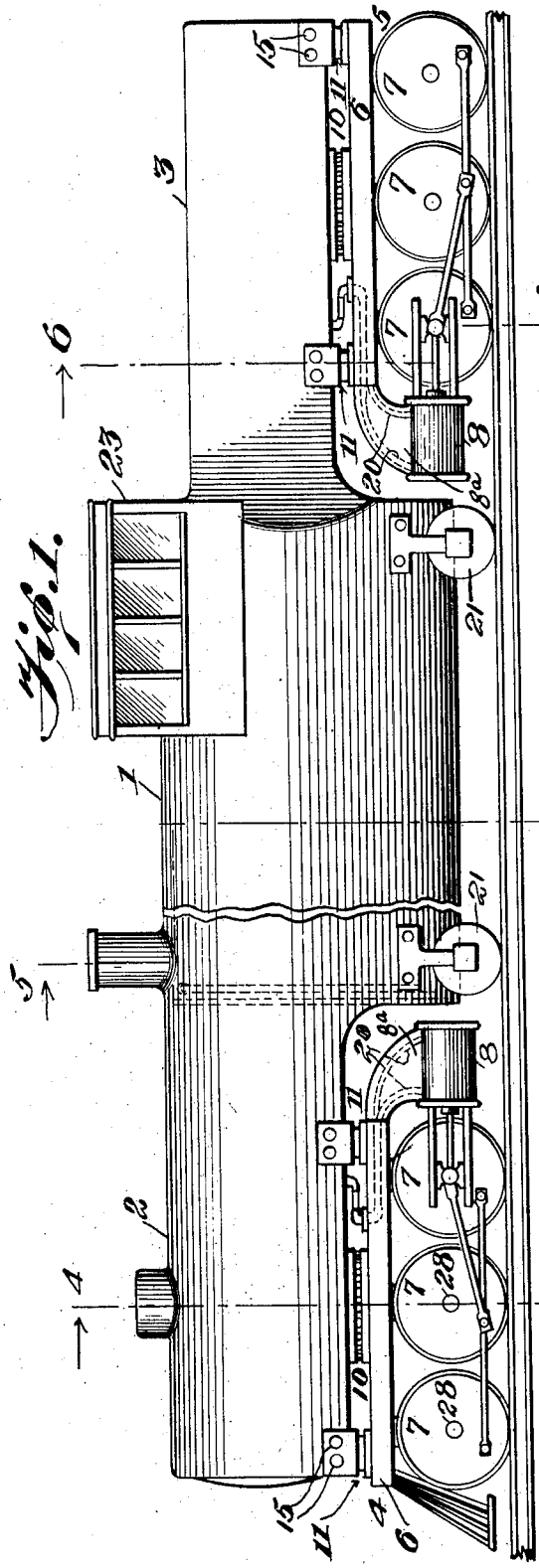


Fig. 1.

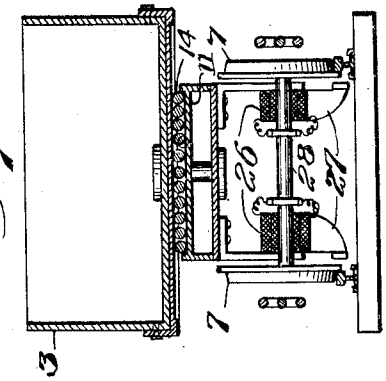


Fig. 6.

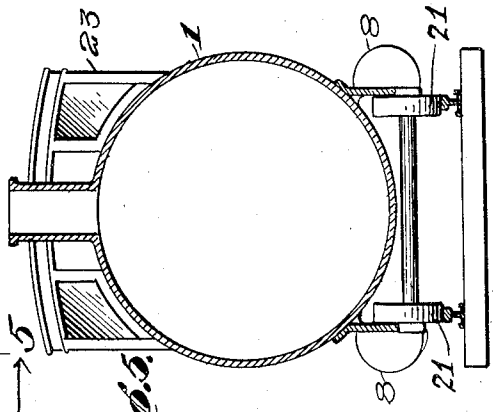


Fig. 5.

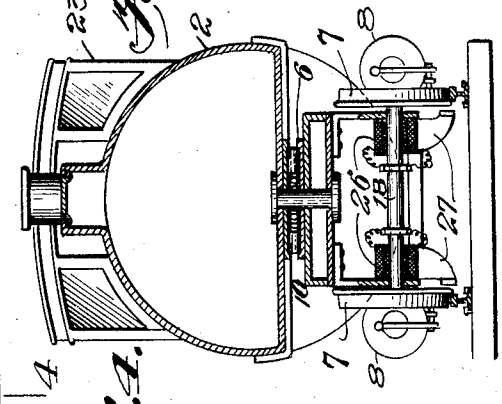


Fig. 4.

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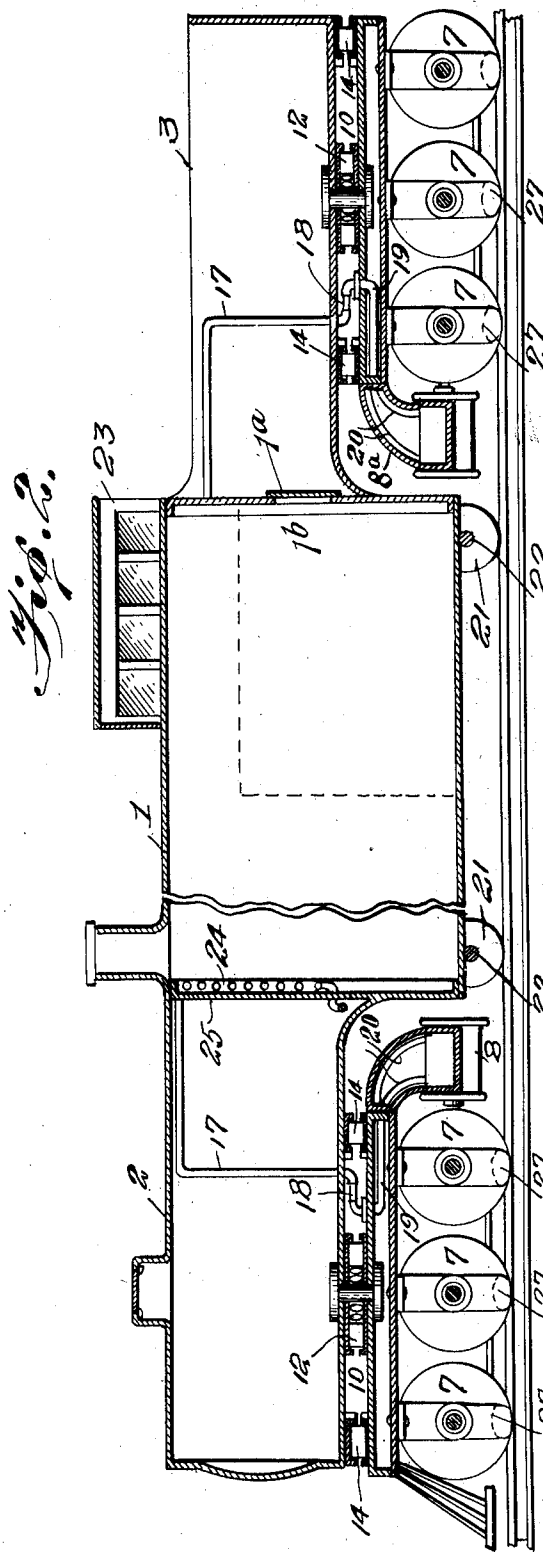


Fig. 2.

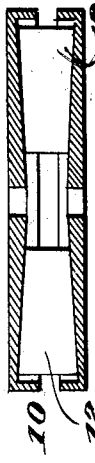


Fig. 8.

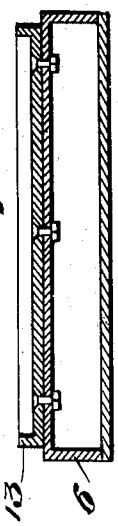


Fig. 9.

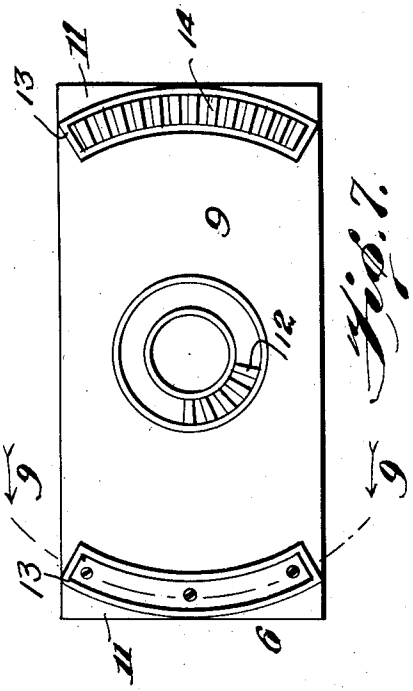


Fig. 7.

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HEAVY DUTY LOCOMOTIVE

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Fig. 3.

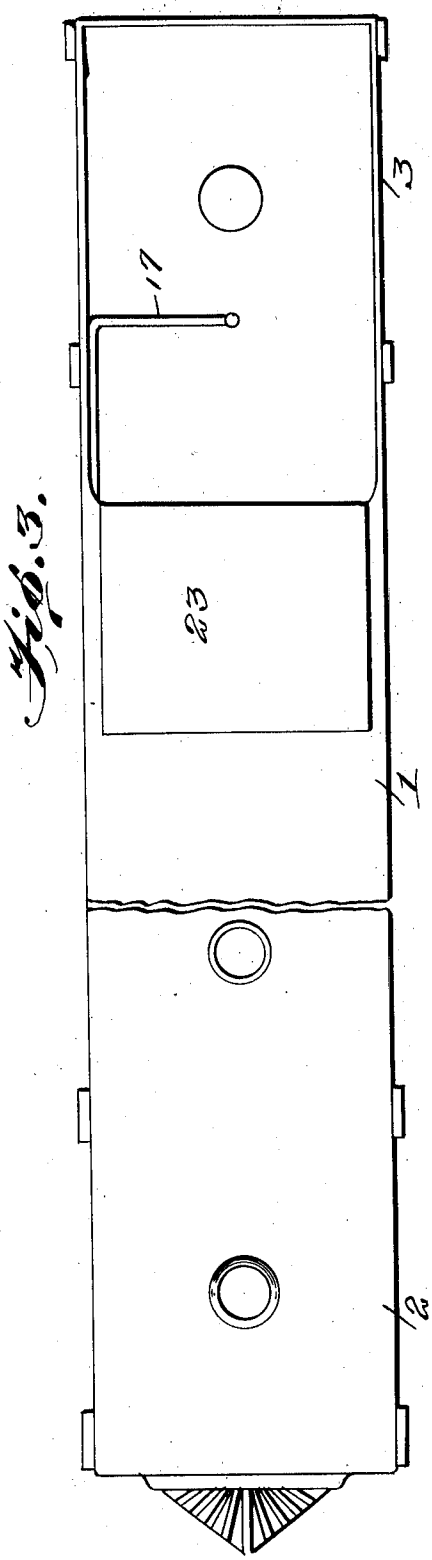


Fig. 12.

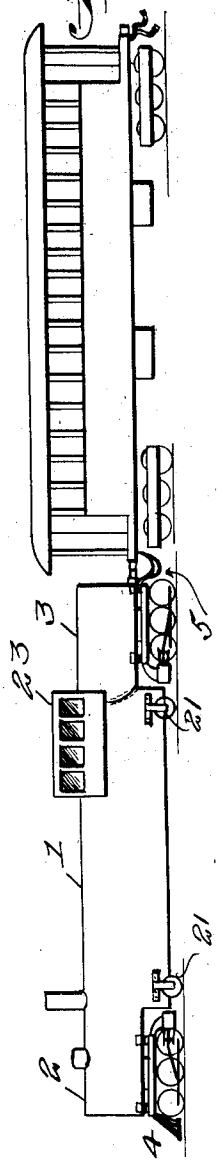


Fig. 13.

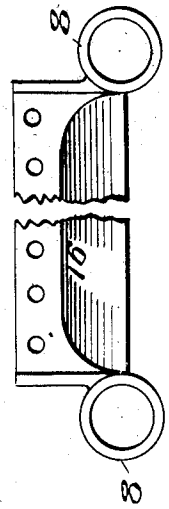
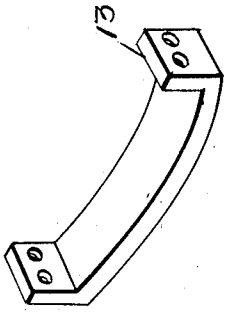


Fig. 11.



Fig. 10.



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UNITED STATES PATENT OFFICE.

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HEAVY-DUTY LOCOMOTIVE.

Application filed February 12, 1926. Serial No. 87,822.

This invention relates to a heavy duty locomotive.

On account of the boiler of the present day locomotive being set above the driving wheels of the heavy duty locomotive type, to increase the size of the boiler to secure increased supply of steam, requires the center of gravity to become higher and higher as the diameter of the boiler is increased, in order that it may not come into contact with the inside surface of the driving wheels between which it is set; the larger the boiler, and consequently the flue heating area, the higher must be placed the center of gravity until, in present heavy duty and passenger locomotives, the center of gravity is as much as seventy-two inches or more above the rails of the track.

Therefore, one of the objects of my invention is the placing of the drive wheels ahead and behind the boiler, whereby the boiler may be doubled in size without increasing its length; its center of gravity may be set so low that it is brought within forty inches above the rails and the bottom of the boiler to a point approximately in line with the clearance of the entire train above the roadbed, or, for instance, within eight to twelve inches of the same.

This lowering of my boiler so radically brings the center of gravity so low that the sway and side thrust of the locomotive, so built will be reduced almost to a minimum and thus inure to the integrity of the track it rests and moves upon, minimizing tendency to pull the spikes and overturn the rails and taking wear by sinking of the rails into the ties, and obviating largely by reducing to a minimum displacing the level of the ties by the constant sway and change of pressure of the locomotive as it travels over the rails, caused by the center of gravity being too high upon heavy duty and passenger locomotives as at present constructed.

Consequently, my method of constructing a locomotive with a boiler down between the front and rear trucks will enable said boiler to be constructed of a diameter approximately twice the size of the standard boiler of today, resulting in increasing greatly the tube area in the boiler, enabling approximately twice the amount of steam to be produced as can be produced in the ordinary heavy duty and passenger locomotive having their boilers set high above the track and restricted to the space between the driving wheels of the trucks.

In my locomotive, with the center of gravity so radically lowered, there will be a constant tendency of the locomotive to go forward in a straight course, as is a well known principle of mechanics and similarly when a curve is encountered, the tendency to turn over, where the center of gravity is elevated, will be reduced to a minimum, and the curve of the track will be taken with a minimum of pressure upon the outside rail, consequently increasing the margin of safety.

This very great increase of boiler size and consequent increase of capacity to produce steam is accomplished without lengthening the boiler, as at present constructed in heavy duty and other steam locomotive.

A further object of the invention is the construction of a locomotive with a boiler between the supporting trucks whereby said boiler may be increased in size to substantial coincidence with the side lines of the entire train and at the bottom with the standard clearance from the roadbed.

Another object of the invention is to provide the front truck with driving wheels of any number, said front truck being independent, so to speak, in movement from the boiler, and this front truck is preferably set below the water tank.

A still further object of the invention is the mounting of the cylinders for working the driving wheels directly upon the front and rear trucks, these cylinders receiving steam from the boiler by means of a flexible connection between the single unitary structure of the boiler, tank and fuel compartment and the trucks.

Another object of the invention is the construction of a rigid unitary structure comprising a peculiarly formed boiler, a water tank and a fuel tank or compartment, and the placing under the water tank of a wheel truck, as well as placing under the fuel tank, a wheel truck, with the extremely low positioned and greatly increased size boiler of the unit between the said wheel trucks.

It is to be understood that the rear set of driving wheels are duplicate of the front set, and that above this rear set or rear truck is supported said fuel tender or tank that may be used to hold or contain crude oil or coal, whichever may be used in "firing" the locomotive.

Another object of the invention is to obtain greatly increased traction of the driving wheels (which may be of any number or any size) already vastly increased by the lowering of the center of gravity of the boiler and consequently, of the locomotive as a whole, and this additional increasing of the traction of the driving wheels is accomplished by my means of magnetizing the driving wheels and the rails; this magnetizing is only temporary, at the point of contact of the driving wheels, causing said wheels to possess a very greatly increased adhesion to the rails, and thus prevent slipping and "burning" of the rails and loss of traction and motion.

The radical increase by means of the size of the boiler over present usage, produced and made possible by placing the driving wheels in front of and to the rear of the boiler, makes possible a greatly increased number of tubes for the flames to pass through, and also permits the fire-box to be radically increased in size. Further, a "nest" of water tubes are placed close to one end of the water tank, and these tubes are connected to the tank and run through the same so that the water in the tank will be satisfactorily heated, whereby when delivered to the injector of the locomotive, it will be warmed by the waste heat of the furnace, and thus discharged in a somewhat heated condition from the injector, thus increasing the efficiency of the boiler in creating steam.

A still further object of my locomotive construction is to produce a boiler with a flue space closer to the fire-box.

With the foregoing and other objects in view, my invention comprises certain novel constructions, combinations and arrangements of parts as will be hereinafter fully described, illustrated in the accompanying drawings, and more particularly pointed out in the appended claims.

In the drawings:

Figure 1 is a view in side elevation of a locomotive constructed in accordance with the present invention.

Figure 2 is a longitudinal, central sectional view of a locomotive constructed in accordance with the present invention.

Figure 3 is a top plan view of a locomotive constructed in accordance with the present invention.

Figure 4 is a sectional view taken on line 4—4, Figure 1, and looking in the direction of the arrows.

Figure 5 is a sectional view taken on line 5—5, Figure 1, and looking in the direction of the arrows.

Figure 6 is a sectional view taken on line 6—6, Figure 1, and looking in the direction of the arrows.

Figure 7 is a top plan view of the bed plate of the trucks.

Figure 8 is a central sectional view of the central bearing device of the trucks.

Figure 9 is a longitudinal sectional view of the truck frame and the lower plate of one of the end bearing devices.

Figure 10 is the top plate of one of the end bearing devices.

Figure 11 is a longitudinal sectional view of the upper plate of one of the end bearing devices.

Figure 12 is a view in side elevation of a locomotive constructed in accordance with the present invention and a standard passenger car or coach, showing the relative size of my locomotive as compared to said passenger car or coach.

Figure 13 is a view in elevation of the frame at the end of each truck for supporting the cylinders, or the cylinder supporting frame.

Referring to the drawings by numerals, 1 denotes the boiler, 2 the water compartment or tank, and 3 is the fuel compartment or tank, better known as the tender; the boiler, water tank, and tender are as one, being formed as a unitary structure, all of a substantial rigid formation. Door 1^a provides access to the fire box space 1^b within boiler 1.

The boiler 1 is in transverse area (Fig. 5) as great as the overall width of the entire train, this boiler 1 being extended downwardly to within a few inches of the rails, as hereinbefore pointed out (in the objects and statements of this invention), for the lowering of the center of gravity and increasing the traction power of the locomotive on the rails.

Beneath the tank 2 and the tender 3, I place trucks 4 and 5, respectively. Each truck comprises a frame 6, driving wheels 7 and cylinders 8; the cylinders are on the lower ends of downwardly extending portions 8^a of frames 6. The top of each frame 6 constitutes a bed plate 9 (Fig. 7), and interposed between the bed plates 9 and the tank 2 and tender 3 are a central bearing device 10 and end bearing devices 11. Each central bearing device 10 is preferably provided with cone bearings 12 (Fig. 8). Between the plates 13 of the end bearing devices 11, I also place cone bearings 14 (Fig. 7). The top plate of each end device 11 has its ends preferably fastened by rivets 15 to the sides of the tank and tender. It is to be understood that the upper plate of the end bearing devices (Fig. 10) has a smooth under face, so as to allow free movement of the plate over the bearings when the locomotive is rounding a curve in the track.

I use the term "tender," with reference to the part 3 of my locomotive in a broad sense, as this "tender" may be in the form of an oil container or a coal container.

A cylinder supporting frame 16 (Fig. 13) is suitably fastened to the inner end of each

frame 6, and at its ends it carries the cylinders 8. These cylinders are connected in any standard manner to the driving wheels 7, whereby when steam is discharged into the cylinders, the driving wheels will be operated. This supplying of steam to the cylinders 8 is accomplished by a steam line 17 extending from the boiler 1 down through the floor of the tank 2 and tender 3 (Fig. 2), and through a flexible connection 18, this steam line 17 is connected to pipe 19 leading to the cylinders 8 through branches 20.

The boiler 1 is suspended between the trucks 5 and 6 and is provided at each side with supporting idle wheels 21. The axles 22 (Fig. 2) of these wheels 21 lie preferably against the bottom of the boiler 1, which bottom is, for instance, approximately eight inches above the rails of the roadbed.

The cab 23 is, preferably, placed or arranged upon the rear portion of the boiler 1.

By reason of the lowering of the bottom line of my boiler 2 into close proximity to the rails, and by practically increasing the circumference of the boiler without materially lengthening the same at all, I am able to place the standard flues closer to the fire-box and since the flues are relatively short in length, the flames from the fire-box can play with great uniform intensity upon the entire length of the flues, thereby greatly increasing the steaming power of my locomotive.

A nest 24 of tubes is supported against the inner end 25 (Fig. 2) of the tank 2 to heat the water in the tank, so that when the water is passed through an ordinary injector, the water being discharged into the boiler will be preheated, which results in a saving in fuel and an increasing of the steam generating power of my locomotive.

In Figures 4 and 6, I have shown how on each truck of the wheel system of my locomotive, I magnetize the driving wheels and the rails to hold the locomotive on the track, eliminating slipping of the driving wheels, especially during the starting of the locomotive, and also greatly reducing wrecks by assisting materially in holding the locomotive on the rails while it is travelling rapidly over the same. This means for magnetizing of the driving wheels and rails includes a dynamo 26, and a magnet 27, whereby the magnet magnetizes the driving wheel and the rail at the point of contact. It is to be understood that I, preferably, arrange two dynamos or generators on each axle 28, to which the driving wheels 7 are fixedly secured. This magnetizing of the driving wheels and the rails greatly increases the traction power, which power is also materially increased over the ordinarily constructed locomotive by reason of the enormous size of my boiler and its low-swung position to the track.

In Figure 12 is shown the relative position and size of my locomotive, as compared to the ordinary passenger, baggage or express car or coach. It will also be seen how low-swung my boiler is, upon the front and rear driving trucks, and in conjunction with Figures 4 and 5, it will also be appreciated that my locomotive over all is no greater in transverse area than the lines at the sides and top of the entire train. Further, by my peculiar construction of a boiler, I obtain double the steaming power without lengthening the locomotive, and this means too, without lengthening the tubes in the boiler, bringing a great number of tubes directly over the fire-box and close to the same where the greatest amount of good is obtained with the minimum loss of fuel, as compared with the present day constructed locomotive.

The objects and statements at the beginning of this specification constitute a vital part of the description of my invention, as I consider this invention of a basic nature, and therefore, the minor details of the locomotive are not so important as the general, basic elements or units going to make up my improved locomotive.

The lowering of the center of gravity and the greatly increased central boiler construction of my locomotive gives the same great traction power which greatly decreases the possibility of my locomotive jumping the track and at the same time bringing the co-ordinate parts of a locomotive of this capacity in a relatively close unitary construction.

While I have described the preferred embodiment of my invention and illustrated the same in the accompanying drawings, certain minor changes or alterations may appear to one skilled in the art to which this invention relates during the extensive manufacture of the same, and I, therefore, reserve the right to make such alterations or changes as shall fairly fall within the scope of the appended claims.

What I claim is:

1. In a locomotive, the combination with driving wheel trucks, of a boiler down between said driving wheel trucks and having at its ends projecting units overhanging said trucks, and ball bearing devices interposed between said trucks and said projecting units whereby the boiler is supported upon the trucks.

2. In a locomotive, the combination of driving wheel trucks including frames, each frame provided at one end with a downwardly extending portion, a cylinder on the lower end of said downwardly extending portion, means connecting the cylinders to the driving wheels of said trucks, and a boiler supported upon said trucks.

3. In a locomotive, the combination of

driving wheel trucks provided with cylinders, a boiler between said trucks and having a tank supported upon one truck and a tender supported upon the other truck, a steam line running from the boiler through said tank contiguous to a truck, a second steam line running from the boiler through said tender contiguous to a truck, pipes connected to said cylinders, and flexible connections beneath the tank and tender and above the trucks and connecting the steam lines to said pipes.

In testimony whereof I hereunto affix my signature.

DAVID R. McGINNIS.